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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

December 6, 1999

BY HAND

Magalie Roman Salas, Secretary
Federal Communications Commission
445 Twelfth Street, S.W. - Suite TW-A325
Washington, D.C. 20554

Re: WT Docket No. 99-168
Ex Parte Presentation
Service Rules for the 746-764 and 776-794 MHz Bands,
And Revisions to Part 27 of the Commission's Rules

Dear Ms. Salas:

On December 3, 1999, Derek Shaeffer and Arvin Shahani of FreeSpace Communications (FreeSpace), Ruth Milkman and Charles Logan of Lawler, Metzger & Milkman, and Janice Obuchowski of Freedom Technologies, Inc. met with Dale Hatfield, Kathleen Ham, Stagg Newman, Julius Knapp, Michael Wilhelm, Ron Netro, Marty Leibman, Sean White, Tom Derenge, and Doug Sicker of the Commission staff. In these meetings, FreeSpace described the wireless telecommunications system it has designed and technical rules for protecting public safety communications systems from interference. These discussions are summarized in greater detail in the attached presentation, which was distributed at the meeting.

Pursuant to section 1.1206(b)(1) of the Commission's rules, 47 C.F.R. § 1.1206(b)(1), an original and one copy of this letter and enclosure are being provided to you for inclusion in the public record of the above-referenced proceeding.

Sincerely,



Charles W. Logan

Enclosure

cc:

Dale Hatfield
Michael Wilhelm
Stagg Newman
Julius Knapp
Ron Netro

Kathleen Ham
Sean White
Doug Sicker
Marty Leibman
Tom Derenge

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FREESPACE COMMUNICATIONS

Ex Parte Presentation

December 3, 1999

Service Rules for 746-764/776-794 MHz Bands

WT Docket No. 99-168

Agenda

- Broadband internet access on the FreeSpace network
- Protection to Public Safety spectrum
- Summary

FreeSpace's technology creates a wireless internet.

- FreeSpace's 700MHz technology provides basic, inexpensive broadband services by sharing access among multiple customers
- Access points can be supplied several ways
 - DSL
 - Cable modem
 - High bandwidth point-to-point or point-to-multipoint wireless link

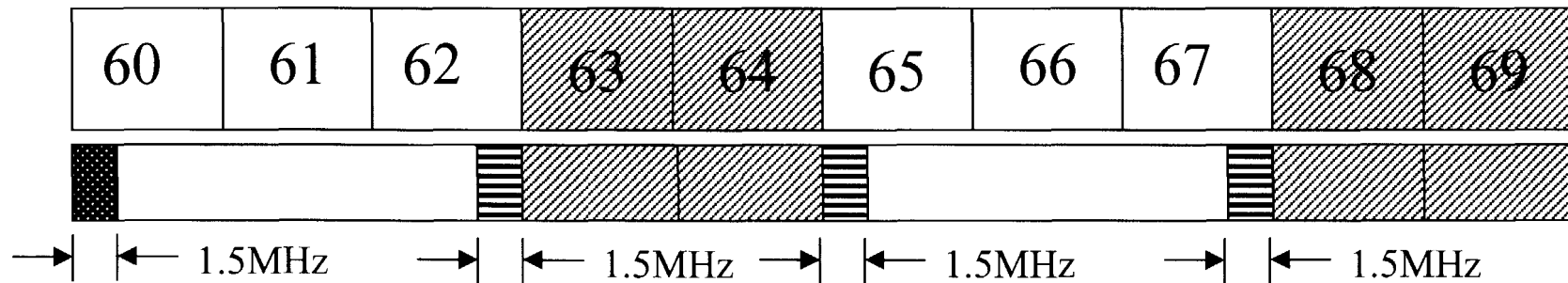
FreeSpace Network Deployment

- Initially the goal is to cover as much area with as little infrastructure as possible
- Over time, as subscribers sign up, infrastructure will be added to increase capacity
- FreeSpace's technology automates this process, making it invisible to the consumer

Differences Between the FreeSpace Network and a Mobile Voice Network

- Sophisticated handoff is not required as in a mobile voice network
- Complete coverage is not necessary to make the service desirable
- FreeSpace fixed sites are compact, inexpensive and easily sited

FreeSpace can use four 1.5MHz bands to deliver broadband services.



License four 1.5MHz, paired channels *with no use restrictions* for innovative, low power uses that protect public safety band:

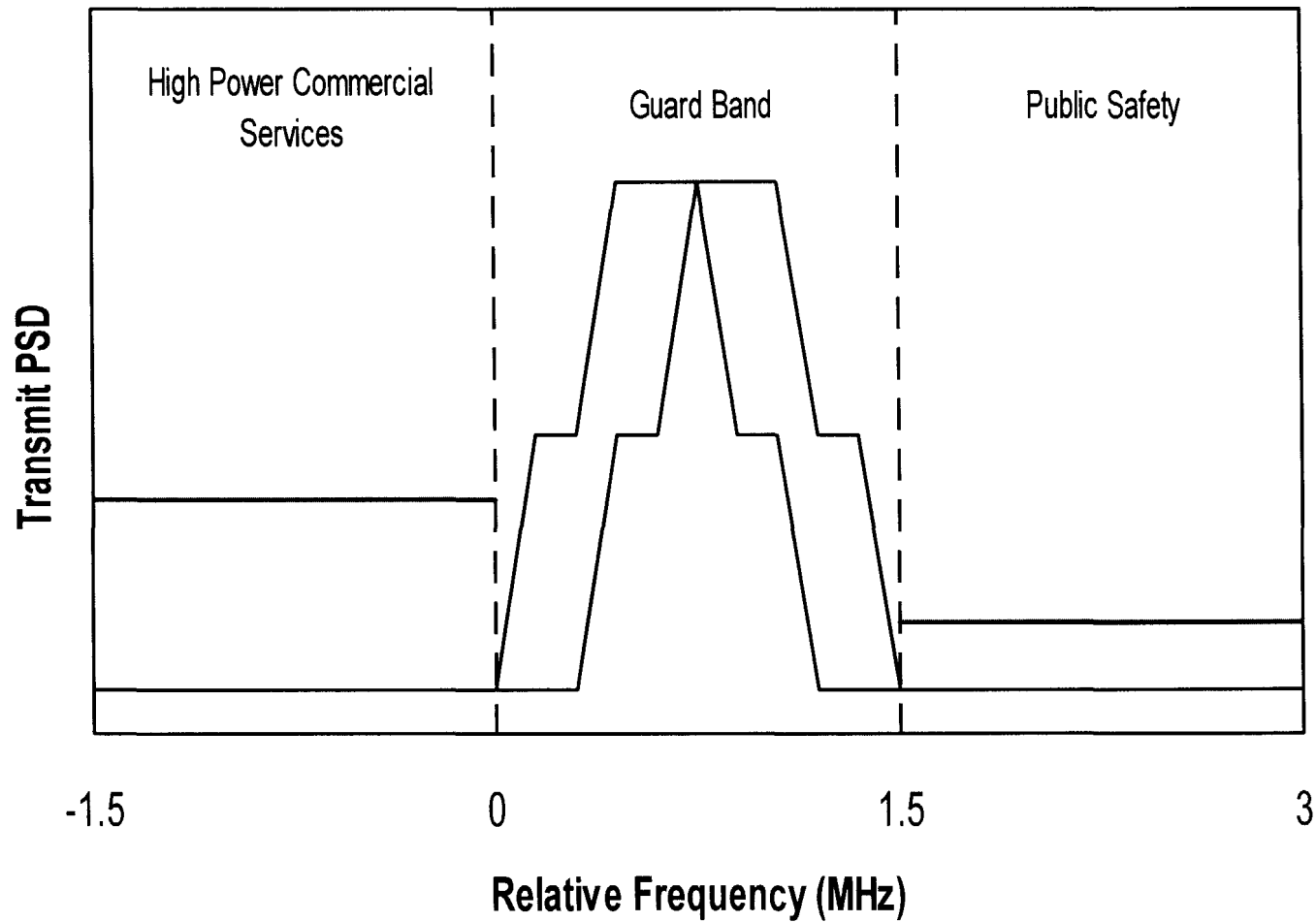
▤ 4mW/kHz ■ > 4mW/kHz

▨ Public Safety

Data Rates

- Assumptions:
 - Channel spacing – 300kHz
 - Number of channels per guard band – 2
 - Modulation – 4b/symbol (e.g., 16QAM)
 - Excess bandwidth factor – 1.2
- Channel data rate $\sim 1\text{Mbps}$

Example Channel Plan



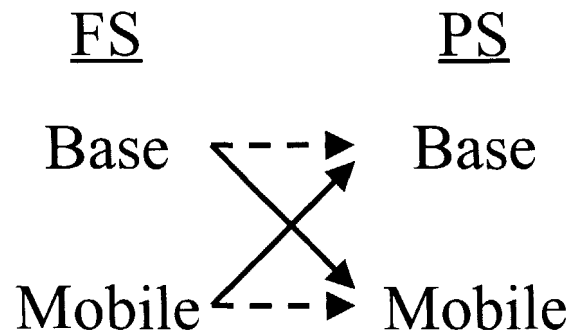
All broadband access techniques take advantage of statistical multiplexing.

- DSL at the central office, cable on the local loop, FreeSpace over the air
- Reasons
 - Subscribers are not always active
 - Internet access is very bursty
 - A lot of Internet content is not highly sensitive to delay
 - Store and forward transport

Interference Protection for Public Safety

- The FCC can, and should, establish technical rules that protect public safety bands from interference while permitting *commercial* use of adjacent spectrum.
- The FreeSpace proposal accomplishes this goal.
 - 1.5MHz guard bands
 - Transmit PSD limits in those bands
 - Specific out-of-band emissions limits
- The guard band licensee should accept whatever interference protection measures the Commission deems appropriate.

Possible Modes of Interference to PS



B - - - -> B
M - - - -> M

Eliminate with Tx restrictions, akin to FDD

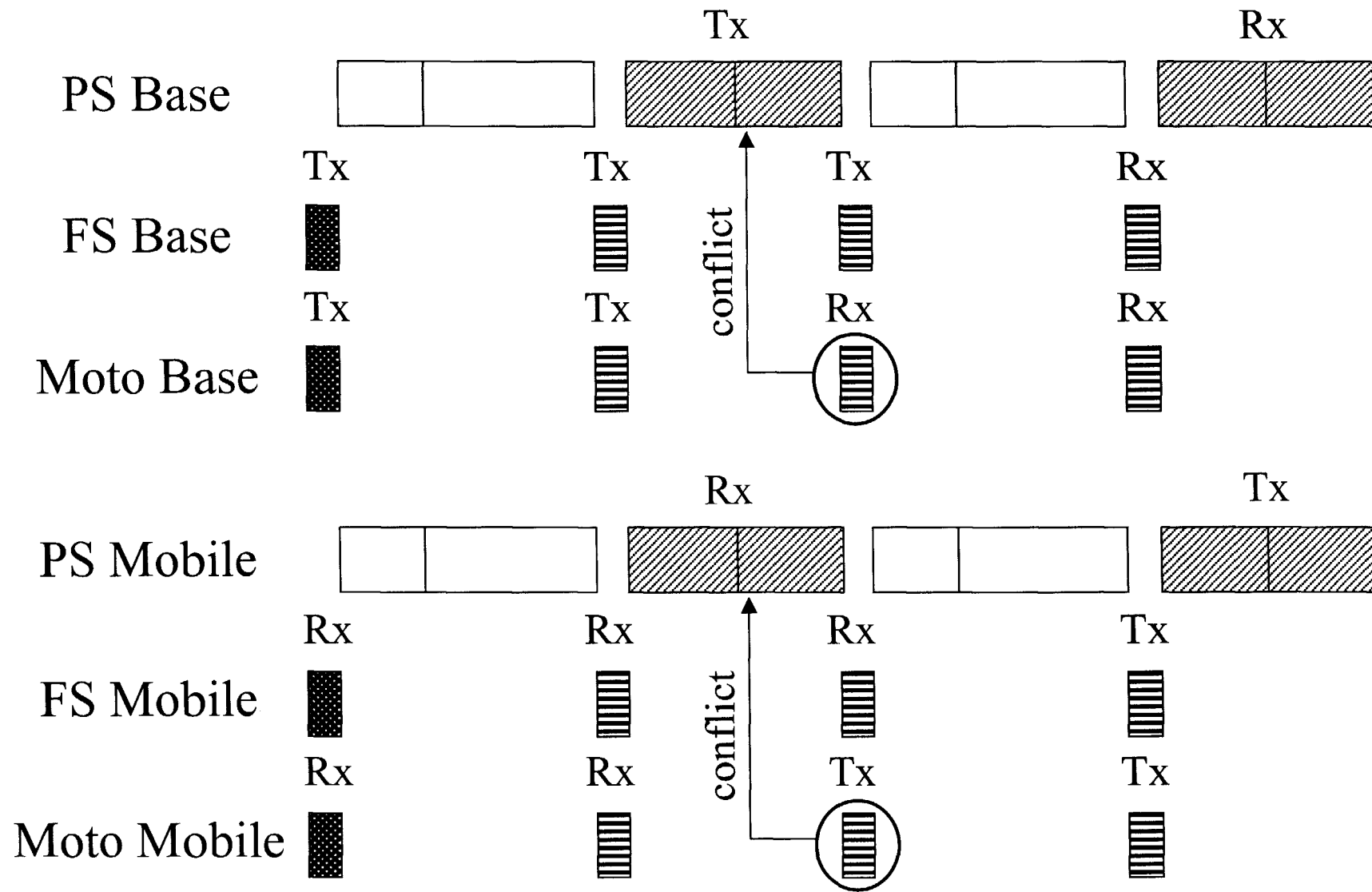
B ———> M

Eliminate with transmit PSD limits and out-of-band emissions limits

M ———> B

Eliminate by *additionally* keeping FS base units (and, thus, active FS mobiles) away from PS base units

Eliminating B-B and M-M Interference to PS



Comments on Tx restrictions

- In protecting public safety, the most natural use of the guard bands is for *asymmetric* (e.g. internet) services.
 - 3 guard bands where base Tx is permissible
 - 1 guard band where mobile Tx is permissible
 - Thus, $\frac{3}{4}$ BW for downlink, $\frac{1}{4}$ BW for uplink
- To protect public safety, the FCC should permit Tx on any guard band as long as it preserves isolation between fixed units and between mobile units
 - Same protection to PS as pure FDD
 - More flexibility in the *lowest* guard band
 - Still permits FDD to be used

Technique for Determining Out-of-Band Emissions Limits

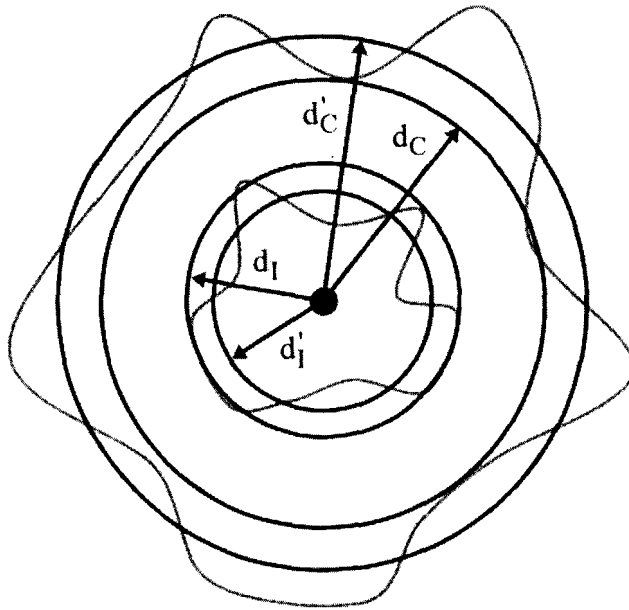


Figure 1. A typical cell. Not to scale.

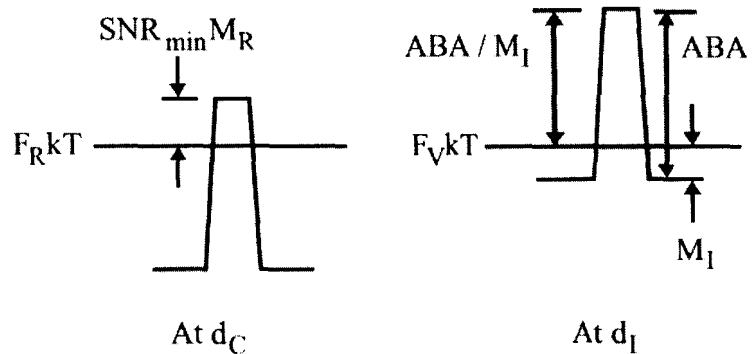


Figure 2. Emissions masks.

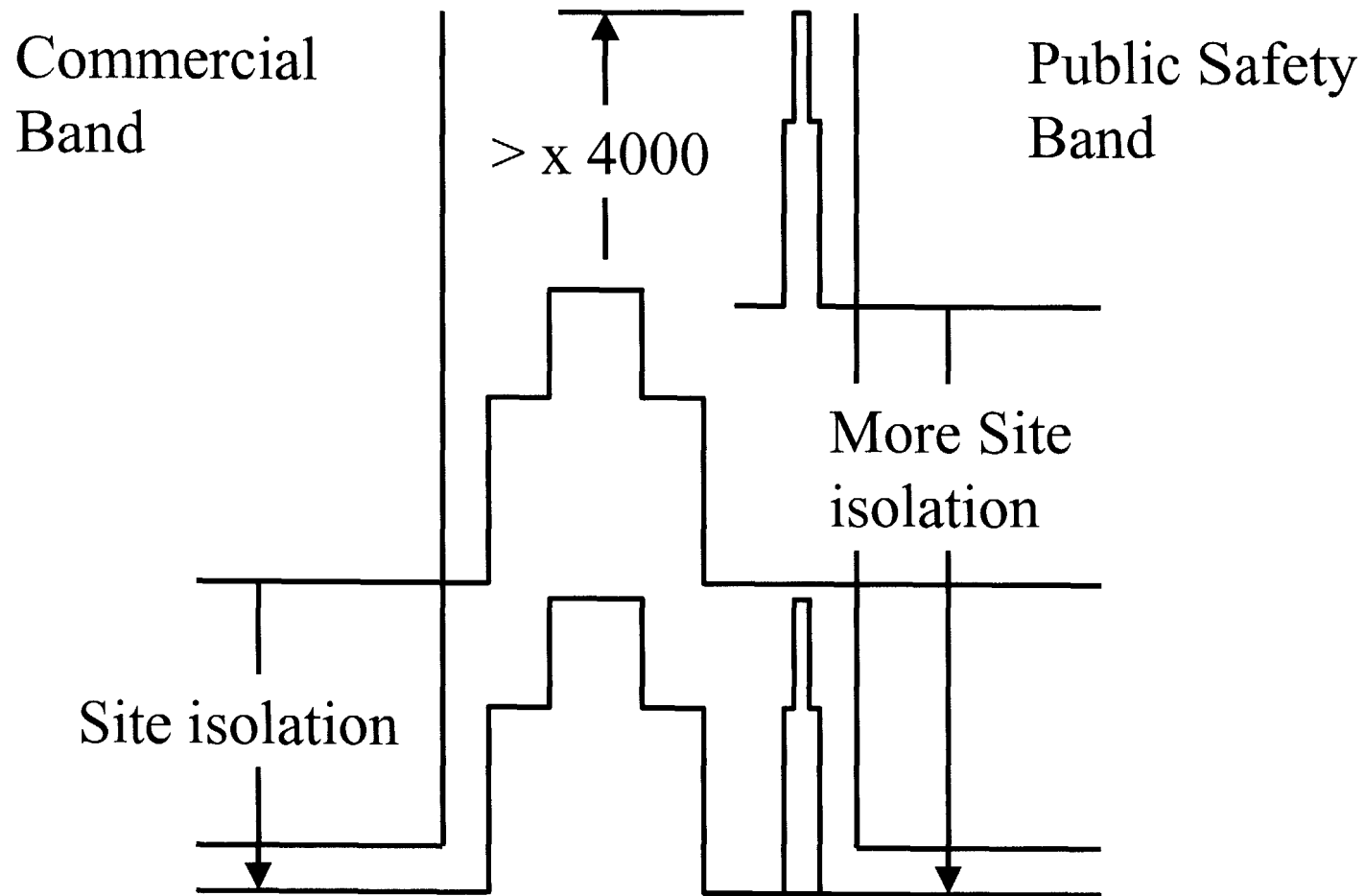
Specific Out-of-Band Emissions Limits

- Conservative Assumptions
 - PS receiver operates at maximum sensitivity, regardless of position
 - “Interference” means that PS unit is desensitized by only 1dB
 - Interference power is 6dB *below* the PS unit noise floor
 - 13dB margins ensure that boundaries of cell and “interference” zones are known with 90% confidence
 - Specify a confidence level of 90% that no interference will occur
 - Consistent with Motorola assumptions of 75dB site isolation, based on 90% confidence curves from measured Nextel data.
- Conservative Result
 - 68dB of attenuation is required at max power (6W)
 - Also assumes max gain base Tx antenna
- Our Proposal: $60 + 10\log(P)$ attenuation for guard band units

Near / Far Scenarios

- Our analysis assumes, with 90% confidence, that even a PS receiver operating at *maximum sensitivity* will be desensitized by *less than 1dB*
 - This is *precisely* the near / far situation
- Only at the boundary of its own coverage area is maximum sensitivity required for clear reception
- Thus, our confidence level is *much higher* that near / far interference problems will rarely occur in practice

Advantages of Low-Power Tx Limits with Specific Out-of-Band Emissions Requirements



Summary

- The FreeSpace network can provide always-on, broadband internet access in 6MHz of total spectrum
- Technical rules for interference protection can and should be established for commercial licensees operating in spectrum adjacent to Public Safety

End

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